

US EPA Mid-Continent Ecology Division

Research Project Summary

In Vitro and In Vivo Biotransformation in Fish: Implications for Physiologically-Based Modeling

Overview

A major area of uncertainty in chemical risk assessments for aquatic organisms is the potential impact of metabolic biotransformation. Although considerable effort has been expended to identify and describe metabolic reaction types, little is known about how these reactions impact the kinetics of parent compounds and metabolites in the tissues where toxicity occurs. The goal of this research is to support the incorporation of in vitro metabolism information into fish physiologically based toxicokinetic (PBTK) models. This will be accomplished using two complementary approaches: 1) development of improved in vitro and in vivo methods for identification of biotransformation products and collection of metabolic rate and capacity parameters, and 2) evaluation of the accuracy of in vitro rate and capacity parameters by direct comparison with in vivo measurements. The long-range objective of this effort is to link PBTK models to biologically-based models of chemical effect.

Key Products

Nichols JW, Hoffman AD, Fitzsimmons PN, and Lien GJ. 2004. Quantification of phenol, phenyl glucuronide, and phenyl sulfate in the blood of unanesthetized rainbow trout by on-line injection microdialysis. (In preparation)

Nichols JW, Hoffman AD, Fitzsimmons PN, Lien GJ, Jenson CT, and Kuehl DW. 2004. In vivo kinetics of phenylglucuronide, a phase II conjugate of phenol, in blood and urine of rainbow trout. (In preparation)

Lien GJ, Nichols JW, Hoffman AD, Jenson CT, and McKim JM. 2004. In vivo rate of phenol glucuronidation by rainbow trout. (In preparation)

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